IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. An identifier indicating the status of each claim is provided.

Listing of Claims

1. (Currently Amended) A flicker reduction method for reducing a fluorescent light flicker component in a video signal or a luminance signal obtained by photographing a subject through an XY addressing type image pickup element under an illumination of a fluorescent lamp, comprising:

a step of integrating the video signal or the luminance signal, as an input image signal, throughout a duration of time equal to or longer than one horizontal period,

a step of normalizing the integrated value or a difference value between the integrated values of adjacent fields or adjacent frames,

a step of extracting a spectrum of the normalized integrated value or the normalized difference value,

wherein a signal component other than a flicker component is extracted as the normalized integrated value or the normalized difference value,

a step of estimating a flicker component from the extracted spectrum,

wherein the estimated flicker component is approximated under the illumination of the fluorescent lamp to a predetermined order;

wherein an amplitude and an initial phase of the estimated flicker component is estimated for each order, and

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a step of performing a calculation operation on the estimated flicker component

and the input image signal to cancel out the estimated flicker component.

2.   (Currently Amended) A flicker reduction method for reducing a

fluorescent light flicker component in each of color signals of colors obtained by photographing

a subject through an XY addressing type image pickup element under an illumination of a

fluorescent lamp, comprising:

a step of integrating the color signal of each color, as an input image signal,

throughout a duration of time equal to or longer than one horizontal period,

a step of normalizing the integrated value or a difference value between the

integrated values of adjacent fields or adjacent frames,

a step of extracting a spectrum of the normalized integrated value or the

normalized difference value,

wherein a signal component other than a flicker component is extracted as the

normalized integrated value or the normalized difference value,

a step of estimating a flicker component from the extracted spectrum,

wherein the estimated flicker component is approximated under the illumination

of the fluorescent lamp to a predetermined order;

wherein an amplitude and an initial phase of the estimated flicker component is

estimated for each order, and

a step of performing a calculation operation on the estimated flicker component

and the input image signal to cancel out the estimated flicker component.

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3.   (Currently Amended) A flicker reduction method for reducing a fluorescent light flicker component in both a luminance signal and each of color signals of colors, obtained by photographing a subject through an XY addressing type image pickup element under an illumination of a fluorescent lamp, comprising:

a step of integrating each of the luminance signal and the color signal of each color, as an input image signal, throughout a duration of time equal to or longer than one horizontal period,

a step of normalizing the integrated value or a difference value between the integrated values of adjacent fields or adjacent frames,

a step of extracting a spectrum of the normalized integrated value or the normalized difference value,

wherein a signal component other than a flicker component is extracted as the normalized integrated value or the normalized difference value,

a step of estimating a flicker component from the extracted spectrum,

wherein the estimated flicker component is approximated under the illumination of the fluorescent lamp to a predetermined order;

wherein an amplitude and an initial phase of the estimated flicker component is estimated for each order, and

a step of performing a calculation operation on the estimated flicker component and the input image signal to cancel out the estimated flicker component.

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4.   (Previously Presented) The flicker reduction method according to claim 1, wherein the normalizing step comprises dividing the difference value by the average value of the integrated values of a plurality of consecutive fields or consecutive frames.

5.   (Withdrawn) The flicker reduction method according to claim 1, wherein the normalizing step comprises dividing the difference value by the average value of the integrated values of a plurality of consecutive fields or consecutive frames, and subtracting a predetermined value from the resulting quotient.

6.   (Previously Presented) The flicker reduction method according to claim 1, wherein the normalizing step comprises dividing the difference value by the integrated value.

7.   (Previously Presented) The flicker reduction method according to claim 1, wherein the spectrum extracting step comprises Fourier transforming the normalized integrated value or the normalized difference value.

8.   (Previously Presented) The flicker reduction method according to claim 1, wherein it is determined whether a level of the input image signal falls within a saturation region, and if it is determined that the level of the input image signal falls within the saturation region, the input image signal is output as is as an output image signal.

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9.   (Withdrawn) The flicker reduction method according to claim 1, wherein

it is determined based on a level of the extracted spectrum whether the input image signal is from

under the illumination of the fluorescent lamp, and if it is determined that the input image signal

is not from under the illumination of the fluorescent lamp, the input image signal is output as is

as an output image signal.

10.   (Withdrawn) The flicker reduction method according to claim 1, wherein

it is determined whether the subject changes greatly in a short period of time in response to an

operation or an action of a photographer, and if it is determined that the subject changes greatly

in a short period of time, one of an immediately precedingly estimated flicker component and a

flicker component estimated from an immediately preceding signal, and the input image signal

are subjected to a calculation operation.

11.   (Withdrawn) The flicker reduction method according to claim 1, wherein

it is determined whether a photographing condition requires a flicker reduction operation and if it

is determined that the flicker reduction operation is determined to be unnecessary, the input

image signal is output as is as an output image signal.

12.   (Previously Presented) The flicker reduction method according to claim 1,

wherein the estimated flicker component is adjusted and the adjusted flicker component and the

input image signal are subjected to the calculation operation.

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13.   (Withdrawn) The flicker reduction method according to claim 1, wherein amplification data and initial phase data of the estimated flicker component are adjusted through respective low-pass filters, and a flicker component to be subjected to the calculation operation together with the input image signal is generated using the adjusted amplification data and the adjusted initial phase data.

14.   (Withdrawn) The flicker reduction method according to claim 13, wherein the adjusted amplitude data and the adjusted initial phase data are stored in a memory, and if a predetermined condition is detected, the flicker component to be subjected to the calculation operation together with the input image signal is generated using the stored amplitude data and the stored initial phase data.

15.   (Currently Amended) An image pickup device comprising:

an XY addressing type image pickup element,

means for integrating a video signal or a luminance signal, as an input image signal, throughout a duration of time equal to or longer than one horizontal period, the video signal or the luminance signal being obtained by photographing a subject through the XY addressing type image pickup element,

means for normalizing the integrated value or a difference value between the integrated values of adjacent fields or adjacent frames,

means for extracting a spectrum of the normalized integrated value or the normalized difference value,

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wherein a signal component other than a flicker component is extracted as the

normalized integrated value or the normalized difference value,

means for estimating a flicker component from the extracted spectrum,

wherein the estimated flicker component is approximated under the illumination

of the fluorescent lamp to a predetermined order;

wherein an amplitude and an initial phase of the estimated flicker component is

estimated for each order, and

means for performing a calculation operation on the estimated flicker component

and the input image signal to cancel out the estimated flicker component.

16.   (Currently Amended) An image pickup device comprising:

an XY addressing type image pickup element,

means for integrating a color signal of each color, as an input image signal,

throughout a duration of time equal to or longer than one horizontal period, the color signal

being obtained by photographing a subject through the XY addressing type image pickup

element,

means for normalizing the integrated value or a difference value between the

integrated values of adjacent fields or adjacent frames,

means for extracting a spectrum of the normalized integrated value or the

normalized difference value,

wherein a signal component other than a flicker component is extracted as the

normalized integrated value or the normalized difference value,

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means for estimating a flicker component from the extracted spectrum,

wherein the estimated flicker component is approximated under the illumination of the fluorescent lamp to a predetermined order;

wherein an amplitude and an initial phase of the estimated flicker component is estimated for each order, and

means for performing a calculation operation on the estimated flicker component and the input image signal to cancel out the estimated flicker component.

17.   (Currently Amended) An image pickup device comprising:

an XY addressing type image pickup element,

means for integrating each of a luminance signal and a color signal of each color, as an input image signal, throughout a duration of time equal to or longer than one horizontal period, the video signal and the luminance signal being obtained by photographing a subject through the XY addressing type image pickup element,

means for normalizing the integrated value or a difference value between the integrated values of adjacent fields or adjacent frames,

means for extracting a spectrum of the normalized integrated value or the normalized difference value,

wherein a signal component other than a flicker component is extracted as the normalized integrated value or the normalized difference value,

means for estimating a flicker component from the extracted spectrum,

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wherein the estimated flicker component is approximated under the illumination of the fluorescent lamp to a predetermined order;

wherein an amplitude and an initial phase of the estimated flicker component is estimated for each order, and

means for performing a calculation operation on the estimated flicker component and the input image signal to cancel out the estimated flicker component.

18.   (Previously Presented) The image pickup device according to claim 15, wherein the normalizing means divides the difference value by the average value of the integrated values of a plurality of consecutive fields or consecutive frames.

19.   (Withdrawn) The image pickup device according to claim 15, wherein the normalizing means divides the difference value by the average value of the integrated values of a plurality of consecutive fields or consecutive frames, and subtracts a predetermined value from the resulting quotient.

20.   (Previously Presented) The image pickup device according to claim 15, wherein the normalizing means divides the difference value by the integrated value.

21.   (Previously Presented) The image pickup device according to claim 15, wherein the spectrum extracting means Fourier transforms the normalized integrated value or the normalized difference value.

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22.   (Previously Presented) The image pickup device according to claim 15,

comprising means for determining whether a level of the input image signal falls within a

saturation region, and outputting the input image signal as is as an output image signal if it is

determined that the level of the input image signal falls within the saturation region.

23.   (Withdrawn) The image pickup device according to claim 15, comprising

means for determining, based on a level of the spectrum extracted by the spectrum extracting

means, whether the input image signal is from under the illumination of the fluorescent lamp,

and outputting the input image signal as is as an output image signal if it is determined that the

input image signal is not from under the illumination of the fluorescent lamp.

24.   (Withdrawn) The image pickup device according to claim 15, comprising

means for determining whether the subject changes greatly in a short period of time in response

to an operation or an action of a photographer, and if it is determined that the subject changes

greatly in a short period of time, causing the calculating means to subject to the calculation

operation, one of a flicker component immediately precedingly estimated by the flicker

component estimating means and a flicker component estimated by the flicker component

estimating means from an immediately preceding signal, and the input image signal.

25.   (Withdrawn) The image pickup device according to claim 15, comprising

means for determining whether a photographing condition requires a flicker reduction operation

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and if it is determined that the flicker reduction operation is unnecessary, outputting the input

image signal as is as an output image signal.

26.   (Previously Presented) The image pickup device according to claim 15,

comprising adjusting means for adjusting the flicker component estimated by the flicker

component estimating means and generating the flicker component to be subjected to the

calculation operation together with the input image signal.

27.   (Withdrawn) The image pickup device according to claim 15, comprising

low-pass filter means for adjusting amplification data and initial phase data of the flicker

component estimated by the flicker component estimating means, and generating the flicker

component to be subjected to the calculation operation together with the input image signal.

28.   (Withdrawn) The image pickup device according to claim 27, comprising

storage means for storing the amplitude data and the initial phase data, adjusted by the low-pass

filter means, and

            means for generating the flicker component to be subjected to the

calculation operation together with the input image signal using the stored amplitude data and the

stored initial phase data if a predetermined condition is detected.

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29.   (Currently Amended) A flicker reduction circuit for reducing a fluorescent

light flicker component in a video signal or a luminance signal obtained by photographing a

subject through an XY addressing type image pickup element under an illumination of a

fluorescent lamp, comprising:

means for integrating the video signal or the luminance signal, as an input image

signal, throughout a duration of time equal to or longer than one horizontal period,

means for normalizing the integrated value or a difference value between the

integrated values of adjacent fields or adjacent frames,

means for extracting a spectrum of the normalized integrated value or the

normalized difference value,

wherein a signal component other than a flicker component is extracted as the

normalized integrated value or the normalized difference value,

means for estimating a flicker component from the extracted spectrum,

wherein the estimated flicker component is approximated under the illumination

of the fluorescent lamp to a predetermined order;

wherein an amplitude and an initial phase of the estimated flicker component is

estimated for each order, and

means for performing a calculation operation on the estimated flicker component

and the input image signal to cancel out the estimated flicker component.

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30.   (Currently Amended) A flicker reduction circuit for reducing a fluorescent

light flicker component in each of color signals of colors obtained by photographing a subject

through an XY addressing type image pickup element under an illumination of a fluorescent

lamp, comprising:

means for integrating the color signal of each color, as an input image signal,

throughout a duration of time equal to or longer than one horizontal period,

means for normalizing the integrated value or a difference value between the

integrated values of adjacent fields or adjacent frames,

means for extracting a spectrum of the normalized integrated value or the

normalized difference value,

wherein a signal component other than a flicker component is extracted as the

normalized integrated value or the normalized difference value,

means for estimating a flicker component from the extracted spectrum,

wherein the estimated flicker component is approximated under the illumination

of the fluorescent lamp to a predetermined order;

wherein an amplitude and an initial phase of the estimated flicker component is

estimated for each order, and

means for performing a calculation operation on the estimated flicker component

and the input image signal to cancel out the estimated flicker component.

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31.   (Currently Amended) A flicker reduction circuit for reducing a fluorescent

light flicker component in each of a luminance signal and each of color signals of colors,

obtained by photographing a subject through an XY addressing type image pickup element under

an illumination of a fluorescent lamp, comprising:

means for integrating each of the luminance signal and the color signal of each

color, as an input image signal, throughout a duration of time equal to or longer than one

horizontal period,

means for normalizing the integrated value or a difference value between the

integrated values of adjacent fields or adjacent frames,

means for extracting a spectrum of the normalized integrated value or the

normalized difference value,

wherein a signal component other than a flicker component is extracted as the

normalized integrated value or the normalized difference value,

means for estimating a flicker component from the extracted spectrum,

wherein the estimated flicker component is approximated under the illumination

of the fluorescent lamp to a predetermined order:

wherein an amplitude and an initial phase of the estimated flicker component is

estimated for each order, and

means for performing a calculation operation on the estimated flicker component

and the input image signal to cancel out the estimated flicker component.

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32.   (Previously Presented) The flicker reduction circuit according to claim 29, wherein the normalizing means divides the difference value by the average value of the integrated values of a plurality of consecutive fields or consecutive frames.

33.   (Withdrawn) The flicker reduction circuit according to claim 29, wherein the normalizing means divides the difference value by the average value of the integrated values of a plurality of consecutive fields or consecutive frames, and subtracts a predetermined value from the resulting quotient.

34.   (Previously Presented) The flicker reduction circuit according to claim 29, wherein the normalizing means divides the difference value by the integrated value.

35.   (Previously Presented) The flicker reduction circuit according to claim 29, wherein the spectrum extracting means Fourier transforms the normalized integrated value or the normalized difference value.

36.   (Previously Presented) The flicker reduction circuit according to claim 29, comprising means for determining whether a level of the input image signal falls within a saturation region, and outputting the input image signal as is as an output image signal if it is determined that the level of the input image signal falls within the saturation region.

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37.   (Withdrawn) The flicker reduction circuit according to claim 29,

comprising means for determining, based on a level of the spectrum extracted by the spectrum

extracting means, whether the input image signal is from under the illumination of the

fluorescent lamp, and outputting the input image signal as is as an output image signal if it is

determined that the input image signal is not from under the illumination of the fluorescent lamp.

38.   (Withdrawn) The flicker reduction circuit according to claim 29,

comprising means, under the control of external means, for causing the calculating means to

perform the calculation operation on one of the flicker component immediately precedingly

estimated by the flicker component estimating means and the flicker component estimated by the

flicker component estimating means based on an immediately prior signal, and the input image

signal.

39.   (Withdrawn) The flicker reduction circuit according to claim 29,

comprising means for outputting the input image signal as is as an output image signal under the

control of external means.

40.   (Withdrawn) The flicker reduction circuit according to claim 29,

comprising means for performing the calculation operation on the flicker component, estimated

by the flicker component estimating means and adjusted by the external means, and the input

image signal.

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